Claims

What is claimed is:

1. A substrate retainer, comprising:

a retainer body configured to removably engage a portion a back side of a substrate; and

a flexure coupled to the retainer body, configured to restrict one or more degrees of movement of the substrate with respect to the substrate retainer.

2. The substrate retainer of Claim 1, wherein the retainer body removably engages the substrate through vacuum control.

3. The substrate retainer of Claim 2, wherein the retainer body includes a contact surface, and an aperture extending through a portion of the contact surface to allow activation and deactivation of a vacuum.

4. The substrate retainer of Claim 1, wherein the retainer body removably engages the portion of the back side of the substrate through a coupling method selected from electrostatic force, VanderWaals force, magnetic forces and capillary attraction.

5. The substrate retainer of Claim 1, wherein the retainer body includes a contact surface to mate with the portion of the back side of the substrate, and the contact surface is faced with a wear resistant material.

6. The substrate retainer of Claim 1, wherein the flexure is configured to resist in plane lateral movement, and allows out of plane movement.

7. The substrate retainer of Claim 6 wherein the in plane lateral movement restricted by the flexure is movement in at least a selected one of a X, a Y and a Θ direction, and the out of plane movement allowed by the flexure includes a Z direction.

8. The substrate retainer of Claim 1, wherein the flexure material is a selected one of steel, aluminum, glass, quartz, synthetic diamond, and sapphire.

9. The substrate retainer of Claim 1, further comprising an actuator configured to controllably urge the flexure and the retainer body in an upward direction to facilitate chucking and dechucking of the substrate.

10. The substrate retainer of Claim 9, wherein the actuator controls the coupling of the retainer body to the portion of the back side of the substrate.

11. A substrate confinement apparatus, comprising:

a global confinement system that causes a substrate to substantially remain in one plane; and

one or more substrate retainers, at least one of which including

a retainer body configured to removably engage a portion of a back side of a substrate; and

a flexure coupled to the retainer body and configured to restrict one or more degrees of movement of the substrate with respect to the substrate retainer.

12. The substrate confinement apparatus of Claim 11, wherein three or more substrate retainers are used and equilaterally spaced from each other.

13. The substrate confinement apparatus of Claim 11, wherein the retainer body removably engages the portion of the back side of the substrate through vacuum control.

14. The substrate confinement apparatus of Claim 11, wherein the retainer body includes a contact surface, and an aperture extending through a portion of the contact surface to allow activation and deactivation of a vacuum.

15. The substrate confinement apparatus of Claim 11, wherein the retainer body removably engages the portion of the back side of substrate through a coupling method selected from electrostatic force, VanderWaals force, magnetic forces and capillary attraction.

16. The substrate confinement apparatus of Claim 11, wherein the retainer body includes a contact surface to engage the portion of the back side of the substrate, and the contact surface is faced with a wear resistant material.

17. The substrate confinement apparatus of Claim 11, wherein the flexure is configured to resist in plane lateral movement, and allows out of plane movement.

18. The substrate confinement apparatus of Claim 17 wherein the lateral movement restricted by the flexure is movement in at least a selected one of a X, a Y and a Θ direction, and the out of plane movement allowed by the flexure is a Z direction.

19. The substrate confinement apparatus of Claim 17, wherein the global confinement apparatus maintains the substrate generally in one plane and the one or more substrate retainers allow for independent local out of plane movement of the substrate.

20. The substrate confinement apparatus of Claim 11, wherein the flexure material is a selected one of steel, aluminum, glass, quartz, synthetic diamond, and sapphire.

21. The substrate confinement apparatus of Claim 11, further comprising an actuator configured to controllably urge the substrate retainer in an upward direction to facilitate loading and unloading of the substrate.

22. The substrate confinement apparatus of Claim 11, wherein the global confinement system includes a plurality if vacuum ports and air jets, and a pressure control to maintain the substrate in substantially one plane.

23. A substrate confinement method, comprising:

providing a substrate having process side and a back side;

providing a substrate confinement apparatus having at least one substrate retainer, each substrate retainer having retainer body configured to removably engage a portion of a back side of a substrate and a flexure coupled to the retainer body and configured to restrict one or more degrees of movement of the substrate with respect to the substrate retainer;

positioning the substrate in the substrate confinement apparatus;

urging the substrate retainer toward the portion of the back side of the substrate;

coupling a contact surface of the retainer body to the portion of the back side of the substrate;

activating a global confinement system; and

removing the actuator from the substrate retainer.

24. The substrate confinement method of Claim 23, further comprising:

processing the substrate; and

decoupling the substrate retainer from the portion of the back side of the substrate.

25. The method of Claim 23, wherein urging the substrate retainer toward the portion of the back side of the substrate includes providing an actuator and raising the actuator to engage the flexure.

26. The method of Claim 23, wherein coupling the contact surface to the portion of the back side of the substrate includes supplying a vacuum to the substrate retainer.